

II B. Tech I Semester Regular Examinations, November 2015

PROBABILITY AND STATISTICS

(Common to Civil Engineering and Information Technology)

Time: 3 Hours**Max. Marks: 60****Note:** All Questions from **PART-A** are to be answered at one place.Answer any **FOUR** questions from **Part-B**. All Questions carry equal Marks.**PART-A****6 x 2 = 12M**

1. A die is thrown. Find the probability of getting a composite number.
2. The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find $P(X \geq 1)$.
3. Define level of significance.
4. Write any two applications of F-test.
5. A sample of size 400 was taken whose variance is 325 and mean is 70. Construct 95% confidence interval for the mean.
6. Arrival rate of telephone calls at a telephone booth are according to Poisson distribution with an average time of 12 minutes between two consecutive call arrivals. The length of telephone calls is assumed to be exponentially distributed with mean 4 minutes. Find the probability that a caller arriving at the booth will have to wait.

PART-B**4 x 12 = 48M**

1. a) In a bolt factory machines A,B,C manufacture 20% ,30 % and 50% of the total of the in output and 6%,3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A (ii) Machine B (iii) Machine C (6M)
b) For the continuous probability function $f(x) = Kx^2e^{-x}$ when $x \geq 0$, Find (i) K (ii) mean (iii) Variance. (6M)
2. a) Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are (i) at least one (ii) at most one. (6M)
b) Find the Moment Generating Function (MGF) of Normal distribution. (6M)
3. a) Explain the two types of sampling techniques. (6M)
b) A random sample of size $n=100$ is taken from a population with $\sigma = 5.1$. Given that the sample mean $\bar{x} = 21.6$, construct a 95% confidence interval for the population mean μ . (6M)

4. a) What are Null and Alternative hypotheses? (6M)
- b) The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches? (6M)
5. a) The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sums of the squares of the deviations from the mean are 26.94 and 18.73 respectively. Can the samples be considered to have been drawn from the same normal population? (6M)
- b) In an investigation on the machine performance, the following results are obtained

	No. of Units inspected	No. of defectives
Machine I	375	17
Machine II	450	22

Test whether there is any significant performance of two machines at $\alpha=0.05$ (6M)

6. a) In a partially destroyed laboratory, record of an analysis of correlation data, the following results only are legible: $V(X)=9$. Regression equations $8X - 10Y + 66 = 0$, $40X - 18Y = 214$, what are (i) the mean values of X & Y (ii) the correlation coefficient between X & Y and (iii) the standard deviation of Y? (6M)
- b) At a railway station, only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hour and the railway station can handle them on an average of 12 per hour. Assuming poisson arrivals and exponential service distribution, find the probability that a train arriving at the station will have to wait. Find also the average waiting time of a new train coming into the yard. (6M)
